

## COLLISION REPAIR: PAINTING AND REFINISHING

### **COURSE DESCRIPTION**

**Collision Repair: Painting and Refinishing** is a course that prepares students to use plastics and adhesives in the repair and refinish processes and to apply automotive paint to a vehicle. Students learn to diagnose automotive paint finish problems and to perform the appropriate manufacturer-required techniques and processes to refinish the affected area or the complete vehicle. Course content provides the student with training in mixing, matching, and applying paint and finish to vehicles. Course content includes the application of plastics and adhesives in the repair and refinish processes. The course prepares students for entry level employment and advanced training in collision repair technology, and post secondary education. Students completing the *Collision Repair: Painting and Refinishing* are eligible to take the ASE written examination for Paint and Refinish and for Plastics and Adhesives.

**Recommended:**

Transportation Core

Algebra I or Technical Algebra; Physical Science or Principles of Technology I, (may be concurrent)

**Requirements:**

A minimum of 340 hours must be dedicated to in Painting and Refinishing and a minimum of 30 hours must be dedicated to Plastics and Adhesives to meet minimum standards set by NATEF.

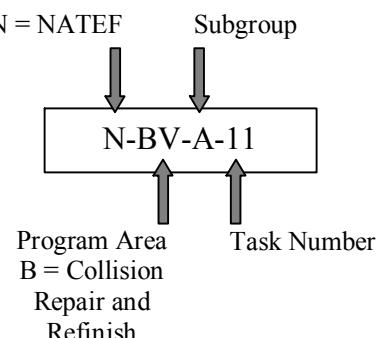
**Recommended Credits:**

**3 or 4 (NATEF Certified Programs Only)**

**Recommended Grade Level(s):** 11 or 12

**Number of Competencies in Course:** 64 / **98**

**Notes:** Course is aligned with NATEF tasks list for Collision Repair and Refinish - Painting and Refinishing and for Plastics and Adhesives. Items have been organized based on the requirements of the state-required course description format. NATEF tasks are referenced with the corresponding Performance Standards. Codes are as follows:



## **COLLISION REPAIR: PAINTING AND REFINISHING**

- 1.0** Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.
- 2.0** Students will demonstrate general painting and refinishing technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for a collision repair and refinish - painting and refinishing facility.
- 3.0** Students will apply mathematics and science concepts to collision repair and refinish technology.
- 4.0** Students will follow proper procedures for preparing vehicles for repainting and refinishing.
- 5.0** Students will properly demonstrate use of spray gun and related equipment operation.
- 6.0** Students will properly mix, match, and apply paint and finish.
- 7.0** Students will properly identify paint defects.
- 8.0** Students will demonstrate proper procedures for final detail.
- 9.0** Students will demonstrate communication skills required in the repair and refinish industry.
- 10.0** Students will demonstrate interpersonal and employability skills required in the collision repair and refinish industry.

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 1.0**

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

### **LEARNING EXPECTATIONS**

The student will:

- 1.1 Demonstrate positive leadership skills in the classroom and community.
- 1.2 Participate in SkillsUSA as an integral part of classroom instruction.
- 1.3 Investigate how technology has made an impact on the paint and refinish industry in the past 2 years.
- 1.4 Construct a job search network.

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 1.1 Serves as a volunteer in the community.
- 1.2A Applies the points of the creed to personal and professional situations.
- 1.2B Assists with an officer campaign with Tennessee SkillsUSA.
- 1.3 Writes a technical report that shows technological advancements in engine performance.
- 1.4A Refines employment portfolio.
- 1.4B Completes a job search for employment opportunities.
- 1.4C Researches job search opportunities through SkillsUSA.

### **SAMPLE PERFORMANCE TASKS**

- Create a leadership inventory and use it to conduct a personal assessment.
- Participate in various SkillsUSA programs and/or competitive events.
- Analyze entry-level job skills and demonstrate proficiency in each skill.
- Implement an annual program of work.
- Attend a professional organization meeting.
- Participate in the Community Service competition with SkillsUSA.
- Places resume on national job search Website with SkillsUSA at [www.skillsusa.org](http://www.skillsusa.org).

### **INTEGRATION LINKAGES**

SkillsUSA, *Professional Development Program*, SkillsUSA, Communications and Writing Skills, Teambuilding Skills, Research, Language Arts, Sociology, Psychology, Math, Technical Math, English IV: Communication for Life, Social Studies, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, SCANS (Secretary's Commission on Achieving Necessary Skills), Chamber of Commerce, Colleges, Universities, Technology Centers, and Employment Agencies

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 2.0**

Students will demonstrate general painting and refinishing technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for a collision repair/painting and refinishing facility.

### **LEARNING EXPECTATIONS**

Students will:

- 2.1** Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.
- 2.2** Identify safety and personal health hazards according to OSHA guidelines and the “Right to Know Law.”
- 2.3** Inspect spray environment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards.
- 2.4** Select and use the National Institute for Occupational Safety & Health (NIOSH) approved personal sanding respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.
- 2.5** Select and use the NIOSH approved (Fresh Air Make-up System) personal painting/refinishing respirator system. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.
- 2.6** Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.).
- 2.7** Passes with 100% accuracy a written examination relating specifically to paint/refinishing safety issues.
- 2.8** Passes with 100% accuracy a performance examination relating specifically to paint/refinishing tools and equipment.
- 2.9** Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 2.1** Identifies and takes necessary precautions with hazardous operations and materials according to federal, state, and local regulations. N-BIV-A-1
- 2.2** Identifies safety and personal health hazards according to OSHA guidelines and the “Right To Know Law”. N-BIV-A-2
- 2.3** Inspects spray environment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards. N-BIV-A-3
- 2.4** Selects and uses the NIOSH approved personal sanding respirator. Inspects condition and ensures fit and operation. Performs proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation. N-BIV-A-4

- 2.5** Selects and uses the NIOSH approved (Fresh Air Make-up System) personal painting/refinishing respirator system. Performs proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation. N-BIV-A-5
- 2.6** Selects and uses the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.).
- 2.7** Passes with 100% accuracy a written examination relating specifically to paint/refinishing safety issues.
- 2.9** Passes with 100% accuracy a performance examination relating specifically to paint/refinishing tools and equipment.
- 2.10** Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

### **SAMPLE PERFORMANCE TASKS**

- Assess the work area for safety hazards.
- Design a corrections program for identified hazards.
- Model the appropriate protective equipment for an assigned task.

### **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 3.0**

Students will apply mathematics and science concepts to collision repair and refinish technology.

### **LEARNING EXPECTATIONS**

The student will:

- 3.1** Relate mathematics to painting and refinishing and plastics and adhesives technology.
- 3.2** Relate chemical concepts to painting and refinishing and plastics and adhesives technology.
- 3.3** Relate physical properties to painting and refinishing and plastics and adhesives technology.
- 3.4** Relate physics concepts to painting and refinishing and plastics and adhesives technology.
- 3.5** Relate optical concepts to painting and refinishing and plastics and adhesives technology.

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

- 3.1A** Determines the appropriate mathematics operation (addition, multiplication, subtraction, or division) for a given situation and mentally arrives at a solution.
- 3.1B** Performs the following calculations:
  - Adds numbers that include decimals to determine conformance with the manufacturer's specifications.
  - Mentally adds two or more numbers to determine conformance with the manufacturer's specifications.
  - Adds whole numbers to accurately determine measurement conformance with the manufacturer's specifications.
  - Divides decimals to determine measurement conformance with the manufacturer's specifications.
  - Divides whole numbers to determine differences for comparison with the manufacturer's specifications.
  - Multiplies (mentally) numbers that include decimals to determine conformance with the manufacturer's specifications.
  - Subtracts whole numbers to determine differences for comparison with the manufacturer's specifications.
  - Mentally and in written form subtracts numbers to arrive at a difference for comparison with the manufacturer's specifications.
- 3.1C** Measures/tests with tools designed for English or metric measurements and then converts the resulting measurement to the system used by the manufacturers for specifying the correct measurement or tolerance.
- 3.1D** Visually formulates the angle of spray pattern or spray equipment.
- 3.1E** Interprets symbols to determine compliance with the manufacturer's specifications.
- 3.2A** Connects the periodic table to the use of chemicals and substances used in painting and refinishing materials use in automobiles.
- 3.2B** Analyzes the role a catalyst plays to an auto body compound.
- 3.2C** Examines how a contaminated liquid can cause a chemical reaction, which results in the deterioration of performance.

- 3.2D** Determines the purpose of adding additives to auto body repair compounds.
- 3.2E** Evaluates the conductivity problems in a circuit when connectors corrode due to electrochemical reactions.
- 3.3A** Demonstrates the proper service procedures based on the physical properties of an automobile component or system that are made of glass or plastic.
- 3.3B** Explores the role that acids and bases have in altering compounds used on or in the automobile.
- 3.3C** Analyzes the role that activators have in causing a change in the chemical state of a compound or filter.
- 3.3D** Examines the surface process that occurs on system seals due to absorption of the contained materials.
- 3.4A** Assesses the characteristics of liquids.
- 3.4B** Reads and interprets data correctly from measurement tools used in painting and refinishing.
- 3.5** Relate optical concepts to painting and refinishing and plastics and adhesives technology.

### **SAMPLE PERFORMANCE TASKS**

- Determine a component's measurement conformance with manufacturer's specification.
- Determine compliance with manufacturer's specifications by interpreting symbols.

### **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 4.0**

Students will follow proper procedures for preparing vehicles for repainting and refinishing.

### **LEARNING EXPECTATIONS**

The student will:

- 4.1 Inspect, remove, store, and replace exterior trim and components necessary for proper surface preparation. HP-I
- 4.2 Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants. HP-I
- 4.3 Inspect and identify substrate, type of finish and surface condition; develop and document a plan for refinishing using a total product system. HP-I
- 4.4 Remove paint finish in accordance with manufacturer's recommendations. HP-I
- 4.5 Dry or wet sand areas to be refinished. HP-I
- 4.6 Featheredge damaged areas to be refinished. HP-I
- 4.7 Apply suitable metal treatment or primer in accordance with total product systems. HP-I
- 4.8 Mask and protect other areas that will not be refinished. HP-I
- 4.9 Mix primer, primer-surfacer or primer-sealer. HP-I
- 4.10 Apply primer onto surface of repaired area. HP-I
- 4.11 Apply two-component finishing filler to minor surface imperfections. HP-I
- 4.12 Dry or wet sand area to which primer-surfacer has been applied. HP-I
- 4.13 Dry sand area to which two-component finishing filler has been applied. HP-I
- 4.14 Remove dust from area to be refinished, including cracks or moldings of adjacent areas. HP-I
- 4.15 Clean area to be refinished using a final cleaning solution. HP-I
- 4.16 Remove, with a tack rag, any dust or lint particles from the area to be refinished. HP-I
- 4.17 Apply suitable sealer to the area being refinished when sealing is needed or desirable. HP-I
- 4.18 Scuff sand to remove nibs or imperfections from a sealer. HP-I
- 4.19 Apply stone chip resistant coating. HP-I
- 4.20 Restore corrosion-resistant coatings, caulking, and seam sealers to repaired areas. HP-I
- 4.21 Prepare adjacent panels for blending. HP-I
- 4.22 Prepare plastic panels for refinishing. HP-I

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 4.1 Inspects, removes, stores, and replaces exterior trim and components necessary for proper surface preparation. N-BIV-B-1
- 4.2 Soap and water washes entire vehicle; uses appropriate cleaner to remove contaminants. N-BIV-B-2
- 4.3 Inspects and identifies substrate, type of finish and surface condition; develops and documents a plan for refinishing using a total product system. N-BIV-B-3
- 4.4 Removes paint finish in accordance with manufacturer's recommendations. N-BIV-B-4

- 4.5** Dry or wet sands areas to be refinished. N-BIV-B-5
- 4.6** Featheredges damaged areas to be refinished. N-BIV-B-6
- 4.7** Applies suitable metal treatment or primer in accordance with total product systems. N-BIV-B-7
- 4.8** Masks and protects other areas that will not be refinished. N-BIV-B-8
- 4.9** Mixes primer, primer-surfacer or primer-sealer. N-BIV-B-9
- 4.10** Applies primer onto surface of repaired area. N-BIV-B-10
- 4.11** Applies two-component finishing filler to minor surface imperfections. N-BIV-B-11
- 4.12** Dry or wet sands area to which primer-surfacer has been applied. N-BIV-B-12
- 4.13** Dry sands area to which two-component finishing filler has been applied. N-BIV-B-13
- 4.14** Removes dust from area to be refinished, including cracks or moldings of adjacent areas. N-BIV-B-14
- 4.15** Cleans area to be refinished using a final cleaning solution. N-BIV-B-15
- 4.16** Removes, with a tack rag, any dust or lint particles from the area to be refinished. N-BIV-B-16
- 4.17** Applies suitable sealer to the area being refinished when sealing is needed or desirable. N-BIV-B-17
- 4.18** Scuff sands to remove nibs or imperfections from a sealer. N-BIV-B-18
- 4.19** Applies stone chip resistant coating. N-BIV-B-19
- 4.20** Restores corrosion-resistant coatings, caulking, and seam sealers to repaired areas. N-BIV-B-20
- 4.21** Prepares adjacent panels for blending. N-BIV-B-21
- 4.22** Prepares plastic panels for refinishing. N-BIV-B-22

### **SAMPLE PERFORMANCE TASKS**

- Prepare a vehicle for repainting.
- Choose and apply an appropriate filler to a vehicle.

### **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 5.0**

Students will properly demonstrate use of spray gun and related equipment operation.

### **LEARNING EXPECTATIONS**

The student will:

- 5.1** Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment). HP-I
- 5.2** Check and adjust spray gun operation for HVLP (high volume, low pressure) or LVLP (low volume, low pressure) guns. HP-I
- 5.3** Set-up (fluid needle, nozzle, and cap), adjust, and test spray gun using fluid, air, and pattern control valves. HP-I

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 5.1** Inspects, cleans, and determines condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment). N-BIV-C-1
- 5.2** Checks and adjusts spray gun operation for HVLP (high volume, low pressure) or LVLP (low volume, low pressure) guns. N-BIV-C-2
- 5.3** Sets-up (fluid needle, nozzle, and cap), adjusts, and test sprays gun using fluid, air, and pattern control valves. N-BIV-C-3

### **SAMPLE PERFORMANCE TASKS**

- Inspect, clean, and prepare spray guns for painting tasks.
- Adjust spray patterns for HVLP (high volume, low pressure) and LVLP (low volume, low pressure) guns.

### **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 6.0**

Students will properly mix, match, and apply paint.

### **LEARNING EXPECTATIONS**

The student will:

- 6.1 Determine type and color of paint already on vehicle by manufacturer's vehicle information label. HP-I
- 6.2 Shake, stir, reduce, catalyze/activate, and strain paint according to manufacturer's procedures. HP-I
- 6.3 Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied. HP-I
- 6.4 Apply selected product on test and let-down panel in accordance with manufacturer's recommendations; check for color match. HP-I
- 6.5 Apply single stage topcoat for refinishing. HP-I
- 6.6 Apply basecoat/clearcoat for panel blending or partial refinishing. HP-I
- 6.7 Denib, buff, and polish finishes where necessary. HP-G
- 6.8 Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials, preparation, and refinishing procedures. HP-I
- 6.9 Apply basecoat/clearcoat for overall refinishing. HP-I
- 6.10 Refinish rigid, semi-rigid and flexible plastic parts. HP-G
- 6.11 Apply multi-stage (tricoat) coats for panel blending or overall refinishing. HP-G
- 6.12 Identify and mix paint using a formula. HP-G
- 6.13 Identify poor hiding colors; determine necessary action. HP-G
- 6.14 Tint color using formula to achieve a blendable match. HP-G
- 6.15 Identify alternative color formula to achieve a blendable match. HP-G

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 6.1 Determines type and color of paint already on vehicle by manufacturer's vehicle information label. N-BIV-D-1
- 6.2 Shakes, stirs, reduces, catalyzes/activates, and strains paint according to manufacturer's procedures. N-BIV-D-2
- 6.3 Applies finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied. N-BIV-D-3
- 6.4 Applies selected product on test and let-down panel in accordance with manufacturer's recommendations; checks for color match. N-BIV-D-4
- 6.5 Applies single stage topcoat for refinishing. N-BIV-D-5
- 6.6 Applies basecoat/clearcoat for panel blending or partial refinishing. N-BIV-D-6
- 6.7 Denibs, buffs, and polishess finishes where necessary. N-BIV-D-8
- 6.8 Identifies the types of rigid, semi-rigid or flexible plastic parts to be refinished; determines the materials, preparation, and refinishing procedures. N-BIV-D-9

- 6.9** Applies basecoat/clearcoat for overall refinishing. N-BIV-D-7
- 6.10** Refinishes rigid, semi-rigid and flexible plastic parts. N-BIV-D-10
- 6.11** Applies multi-stage (tricoat) coats for panel blending or overall refinishing. N-BIV-D-11
- 6.12** Identifies and mixes paint using a formula. N-BIV-D-12
- 6.13** Identifies poor hiding colors; determines necessary action. N-BIV-D-13
- 6.14** Tints color using formula to achieve a blendable match. N-BIV-D-14
- 6.15** Identifies alternative color formula to achieve a blendable match. N-BIV-D-15

### **SAMPLE PERFORMANCE TASKS**

- Identify the paint defect on a vehicle and correct problem.
- Mix paint according to a specified formula.

### **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 7.0**

Students will demonstrate properly identify paint defects.

### **LEARNING EXPECTATIONS**

The student will:

- 7.1** Identify blistering (raising of the paint surface); determine the cause(s) and correct the condition. HP-G
- 7.2** Identify blushing (milky or hazy formation); determine the cause(s) and correct the condition. HP-G
- 7.3** Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition. HP-G
- 7.4** Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s) and correct the condition. HP-G
- 7.5** Identify lifting; determine the cause(s) and correct the condition. HP-G
- 7.6** Identify clouding (mottling and streaking in metallic finishes); determine the cause(s) and correct the condition. HP-G
- 7.7** Identify orange peel; determine the cause(s) and correct the condition. HP-G
- 7.8** Identify overspray; determine the cause(s) and correct the condition. HP-G
- 7.9** Identify solvent popping in freshly painted surface; determine the cause(s) and correct the condition. HP-G
- 7.10** Identify sags and runs in paint surface; determine the cause(s) and correct the condition. HP-G
- 7.11** Identify sanding marks (sandscratch swelling); determine the cause(s) and correct the condition. HP-G
- 7.12** Identify contour mapping (shrinking and splitting) while finish is drying; determine the cause(s) and correct the condition. HP-G
- 7.13** Identify color difference (off-shade); determine the cause(s) and correct the condition. HP-G
- 7.14** Identify tape tracking; determine the cause(s) and correct the condition. HP-G
- 7.15** Identify low gloss condition; determine the cause(s) and correct the condition. HP-G
- 7.16** Identify poor adhesion; determine the cause(s) and correct the condition. HP-G
- 7.17** Identify paint cracking (crowsfeet or line-checking, micro-checking, etc.); determine the cause(s) and correct the condition. HP-G
- 7.18** Identify corrosion; determine the cause(s) and correct the condition. HP-G
- 7.19** Identify dirt or dust in the paint surface; determine the cause(s) and correct the condition. HP-I
- 7.20** Identify water spotting; determine the cause(s) and correct the condition. HP-G
- 7.21** Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition. HP-G
- 7.22** Identify finish damage caused by airborne contaminants (acids, soot, and other industrial-related causes); correct the condition. HP-G

- 7.23** Identify die-back conditions (dulling of the paint film showing haziness); determine the cause(s) and correct the condition. HP-G
- 7.24** Identify chalking (oxidation); determine the cause(s) and correct the condition. HP-G
- 7.25** Identify bleed-through (staining); determine the cause(s) and correct the condition. HP-G
- 7.26** Identify pin-holing; determine the cause(s) and correct the condition. HP-G
- 7.27** Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition. HP-I
- 7.28** Identify pigment flotation (color change through film build); determine the cause(s) and correct the condition. HP-G
- 7.29** Measure mil thickness. HP-I

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 7.1** Identifies blistering (raising of the paint surface); determines the cause(s) and corrects the condition. N-BIV-E-1
- 7.2** Identifies blushing (milky or hazy formation); determines the cause(s) and corrects the condition. N-BIV-E-2
- 7.3** Identifies a dry spray appearance in the paint surface; determines the cause(s) and corrects the condition. N-BIV-E-3
- 7.4** Identifies the presence of fish-eyes (crater-like openings) in the finish; determines the cause(s) and corrects the condition. N-BIV-E-4
- 7.5** Identifies lifting; determines the cause(s) and corrects the condition. N-BIV-E-5
- 7.6** Identifies clouding (mottling and streaking in metallic finishes); determines the cause(s) and corrects the condition. N-BIV-E-6
- 7.7** Identifies orange peel; determines the cause(s) and corrects the condition. N-BIV-E-7
- 7.8** Identifies overspray; determines the cause(s) and corrects the condition. N-BIV-E-8
- 7.9** Identifies solvent popping in freshly painted surface; determines the cause(s) and corrects the condition. N-BIV-E-9
- 7.10** Identifies sags and runs in paint surface; determines the cause(s) and corrects the condition. N-BIV-E-10
- 7.11** Identifies sanding marks (sandscratch swelling); determines the cause(s) and corrects the condition. N-BIV-E-11
- 7.12** Identifies contour mapping (shrinking and splitting) while finish is drying; determines the cause(s) and corrects the condition. N-BIV-E-12
- 7.13** Identifies color difference (off-shade); determines the cause(s) and corrects the condition. N-BIV-E-13
- 7.14** Identifies tape tracking; determines the cause(s) and corrects the condition. N-BIV-E-14
- 7.15** Identifies low gloss condition; determines the cause(s) and corrects the condition. N-BIV-E-15
- 7.16** Identifies poor adhesion; determines the cause(s) and corrects the condition. N-BIV-E-16
- 7.17** Identifies paint cracking (crowsfeet or line-checking, micro-checking, etc.); determines the cause(s) and corrects the condition. N-BIV-E-17
- 7.18** Identifies corrosion; determines the cause(s) and corrects the condition. N-BIV-E-18

- 7.19** Identifies dirt or dust in the paint surface; determines the cause(s) and corrects the condition. N-BIV-E-19
- 7.20** Identifies water spotting; determines the cause(s) and corrects the condition. N-BIV-E-20
- 7.21** Identifies finish damage caused by bird droppings, tree sap, and other natural causes; corrects the condition. N-BIV-E-21
- 7.22** Identifies finish damage caused by airborne contaminants (acids, soot, and other industrial-related causes); corrects the condition. N-BIV-E-22
- 7.23** Identifies die-back conditions (dulling of the paint film showing haziness); determines the cause(s) and corrects the condition. N-BIV-E-23
- 7.24** Identifies chalking (oxidation); determines the cause(s) and corrects the condition. N-BIV-E-24
- 7.25** Identifies bleed-through (staining); determines the cause(s) and corrects the condition. N-BIV-E-25
- 7.26** Identifies pin-holing; determines the cause(s) and corrects the condition. N-BIV-E-26
- 7.27** Identifies buffing-related imperfections (swirl marks, wheel burns); corrects the condition. N-BIV-E-27
- 7.28** Identifies pigment flotation (color change through film build); determines the cause(s) and correct the condition. N-BIV-E-28
- 7.29** Measures mil thickness. N-BIV-E-29

### **SAMPLE PERFORMANCE TASKS**

- Identify the paint defect on a vehicle and correct problem.
- Identify the cause of paint defect on a vehicle and correct problem.

### **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 8.0**

Students will demonstrate proper procedures for Final Detail.

### **LEARNING EXPECTATIONS**

The student will:

- 8.1 Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc. HP-G**
- 8.2 Buff and polish finish to remove defects as required. HP-I**
- 8.3 Clean interior, exterior, and glass. HP-I**
- 8.4 Clean body openings (door jambs & edges, etc.). HP-I**
- 8.5 Remove overspray. HP-I**

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 8.1 Applies decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc. N-BIV-F-1**
- 8.2 Buffs and polishes finish to remove defects as required. N-BIV-F-2**
- 8.3 Cleans interior, exterior, and glass. N-BIV-F-3**
- 8.4 Cleans body openings (door jambs & edges, etc.). N-BIV-F-4**
- 8.5 Removes overspray. N-BIV-F-5**

### **SAMPLE PERFORMANCE TASKS**

- Buff, polish, and clean exterior and interior on vehicle.
- Clean body openings and glass.
- Remove overspray and apply decals.

### **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 9.0**

Students will demonstrate communication skills required in the repair and refinish industry.

### **LEARNING EXPECTATIONS**

The student will:

- 9.1** Communicate and comprehend oral and written information typically occurring in the automotive collision repair/painting and refinishing workplace.
- 9.2** Solve painting and refinishing and plastics and adhesives problems and make decisions using a logical process.
- 9.3** Use teamwork skills to accomplish goals, solve problems, and manage conflict within groups.

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 9.1A** Interprets and uses written information in common job formats, such as tables, charts, and reference materials and manuals relating to painting and refinishing and plastics and adhesives.
- 9.1B** Interprets and uses graphical information such as blueprints, electrical schematics, process control schematics, flow diagrams, and other diagrams.
- 9.1C** Uses electronic resources to obtain information relating to painting and refinishing and plastics and adhesives.
- 9.1D** Analyzes information obtained from various sources to determine a diagnostic approach.
- 9.1E** Communicates clearly and appropriately in oral and written form.
- 9.2A** Develops a hypothesis regarding the cause of a paint defect.
- 9.2B** Tests the hypothesis to determine the solution to the paint defect.
- 9.2C** Creates, evaluates, and revises as needed a plan to resolve a paint defect.
- 9.3A** Serves in each of the functional roles of a team.
- 9.3B** Resolves conflicts within a group.
- 9.3C** Demonstrates appropriate and positive examples of giving and accepting criticism.
- 9.3D** Modifies behavior or revises work based on appropriate criticism.
- 9.3E** Solves problems in cooperation with other members of a group.
- 9.3F** Evaluates the role of the painting and refinishing technician within the organizational system.

## **SAMPLE PERFORMANCE TASKS**

- Use reference materials to determine procedures for painting and refinishing.
- Work as a team member to develop an analytical strategy.

## **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **STANDARD 10.0**

Students will demonstrate interpersonal and employability skills required in the collision repair and refinish industry.

### **LEARNING EXPECTATIONS**

The student will:

- 10.1** Evaluate career goals and establish long-term goals.
- 10.2** Demonstrate attitudes conducive to workplace success.
- 10.3** Maintain a neat and orderly work area.
- 10.4** Assess implications of diversity for communities, workplaces, and manufacturers.
- 10.5** Develop personal financial skills.
- 10.6** Develop individual time management and work sequencing skills relating to painting and refinishing and adhesives and plastics.

### **PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET**

The student:

- 10.1A** Explores opportunities for advanced training.
- 10.1B** Assesses the potential impact of an individual's educational level on an organizational system.
- 10.1C** Infers the relationship between work ethics, education, and personal job success.
- 10.2A** Judges which attitudes and behaviors are conducive to success.
- 10.2B** Models customer service skills.
- 10.3A** Keeps work area organized and free from clutter according to NATEF and OSHA standards.
- 10.3B** Deduces the correlation between a clean orderly work environment and successful and efficient job performance and earnings.
- 10.4A** Points out potential benefits and problems that may arise from diversity in the collision repair and refinish service workplace, including manufacturer diversity.
- 10.4B** Devises solutions to problems arising from gender, cultural, racial, and religious diversity.
- 10.5A** Develops a personal budget.
- 10.5B** Sets personal financial goals.
- 10.6** Displays time management and work sequencing skills in class assignments and work assignments.

### **SAMPLE PERFORMANCE TASKS**

- Maintain an orderly work area.
- Consistently arrive at class on time.
- Participate in an internship in a dealership or fleet shop.
- Resolve an interpersonal conflict in the classroom.

## **INTEGRATION LINKAGES**

Math, Science, Chemistry, Physics, Communication Skills, Teamwork Skills, Reading Skills, Leadership Skills, Problem Solving and Critical Thinking Skills, Computer Skills, Art and Design, Computer Aided Design, Secretary's Commission on Achieving Necessary Skills (SCANS), National Institute for Automotive Service Excellence, (ASE) National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), SkillsUSA

## **COLLISION REPAIR: PAINTING AND REFINISHING**

### **SAMPLING OF AVAILABLE RESOURCES**

*Enhanced Delivery I-Car Curriculum, I-CAR*

*Auto Collision Curriculum Guide, Instructional Materials Laboratory (IML), University of Missouri*

*Professional Automotive Collision Repair, 2nd Ed, Duffy, Delmar Publishing*

*Auto Body Repairing and Refinishing, Goodheart-Willcox, 2000.*

Teacher Web resources:

Math/Science Web Site <http://enc.org>

National Science Teachers Association <http://www.nsta.org/store>

Center for Occupational Research and Development (CORD) <http://www.cord.org/>

Delmar International Thomson Learning <http://www.delmar.com/>

University of Missouri Instructional Materials Lab (IML)  
<http://www.iml.coe.missouri.edu/>

Oklahoma Curriculum Instructional Materials Center (CIMC)  
<http://www.okvotech.org/cimc/home.htm>